

REMARKS

This submission is responsive to the Office Action dated May 18, 2009. Applicant has not amended any claims. Claims 1–86 are pending.

Summary of Examiner Interview

In a telephonic interview initiated by Applicant's representative, Jessica H. Kwak, on October 14, 2009, Ms. Kwak, and Examiner Michael R. Ballinger discussed the present application. The parties generally discussed the invention and the primary reference applied in the Office Action dated May 18, 2009, Chapoulaud et al. (U.S. Patent Application Publication No. 2002/0028417, hereinafter referred to as "Chapoulaud"). Ms. Kwak requested clarification of the Examiner's characterization of the Chapoulaud reference, and, in particular, the feature of the Chapoulaud reference that the Examiner is characterizing as a planar guide.

In a follow-up telephonic interview on October 15, 2009, Examiner Ballinger indicated that if Applicant did not amend the claims in the response to the Office Action dated May 18, 2009, the next Office Action would be made nonfinal.

No exhibits were introduced during the interview, and no agreement was reached with respect to the claims during the telephonic interviews. Applicant thanks Examiner Ballinger for taking the time to discuss the application with Ms. Kwak.

Objection to the Drawings

In the Office Action, the drawings were objected to under 37 C.F.R. § 1.83(a) on the basis that the drawings fail to show a sheath and a button, which are recited in Applicant's claims 38 and 74. The Office Action asserted that the terms "button" and "sheath" as used in claims 38 and 74 do not alone adequately describe sufficient structure to support the limitations as claimed.¹ The Examiner requested corrected drawings showing a button and a sheath as recited in the claims. Applicant respectfully disagrees with the objection as Applicant has submitted such drawings.

Specifically, with the Amendment filed on December 17, 2008, Applicant submitted replacement drawing sheet for FIG. 1 as originally filed. The replacement drawing sheet illustrated, among other things, labeled rectangular boxes for a button 5C and a sheath 5D, which

¹ Office Action dated May 18, 2009, page 2, item 4.

are referred to Applicant's originally-filed disclosure, such as at paragraph [0063]. As provided in 37 C.F.R. § 1.83(a), a conventional feature disclosed in the description and claims should be illustrated in the drawing in the form of a graphical drawing symbol or a labeled representation (e.g., a labeled rectangular box) where their detailed illustration is not essential for a proper understanding of the invention. The button 5C and sheath 5D described in Applicant's description and claims are conventional features (i.e., conventional orthodontic appliances) for which a detailed illustration is not essential for a proper understanding of the invention.

One having ordinary skill in the art would understand that a button and a sheath are conventional orthodontic appliances, the structures of which are well known and need not be illustrated in detail. As known in the art, a button commonly refers to an orthodontic attachment that can be bonded to a tooth or a band. An orthodontic button can provide a handle for elastic traction. A sheath is also well known in the art as being an orthodontic attachment that can be attached to a tooth. The orthodontic sheath can be configured to receive, e.g., a wire.

With this Response, Applicant has submitted a Declaration Under 37 C.F.R. § 1.132, executed by Richard E. Raby, an inventor of the present application, which establishes that a button and a sheath are well known types of orthodontic appliances that have been used for at least the past twenty years in industry. The Declaration Under 37 C.F.R. § 1.132 refers to Exhibits A and B, which are pages from a Glossary of Orthodontic Terms by John Daskalogiannakis, DDS, MSc. (Quintessence Publishing Co., Berlin, 2000). Exhibits A and B provide evidence that demonstrate that a button and a sheath are well known types of orthodontic appliances. Consequently, in accordance with 37 C.F.R. § 1.83(a), details of a conventional button and sheath need not be shown in Applicant's drawings.

For at least these reasons, Applicant respectfully submits that the previously-filed replacement drawing sheet for FIG. 1 sufficiently illustrates conventional features disclosed in the description and claims, and the terms "button" and "sheath" used in claims 38 and 74 adequately describe sufficient structure to support the limitations as claimed. Reconsideration and withdrawal of the objection to the drawings are respectfully requested.

Objection to the Specification

In the Office Action, the amendments to specification presented in the Amendment filed on December 17, 2008 were objected to under 35 U.S.C. § 132(a) on the basis that the

amendments introduced new matter into the disclosure. In particular, the Office Action asserted that the added text of “[t]he techniques may readily be applied to positioning and orienting other types of orthodontic appliances relative to teeth or other regions of a dental arch. For example, the techniques may readily be used to assist a practitioner in placing, positioning, forming or otherwise designing a wide variety of appliances, such as buccal tubes 5B, buttons 5C, sheaths 5D, arch wires 5E, and other orthodontic appliances” does not have adequate support in the original disclosure.² Applicant respectfully disagrees.

The amendments to the specification presented in the Amendment filed on December 17, 2008 are fully supported by Applicant’s disclosure as originally-filed, such as at paragraph [0063]. Paragraph [0063] states that:

For exemplary purposes, the techniques described herein have been illustrated in reference to assisting a practitioner with the placement and orientation of orthodontic brackets. However, the techniques may readily be applied to positioning and orienting other types of orthodontic appliances relative to teeth or other regions of a dental arch. For example, the techniques may readily be used to assist a practitioner in placing, positioning, forming or otherwise designing a wide variety of appliances, such as buccal tubes, buttons, sheaths, arch wires, and other orthodontic appliances. Consequently, the term orthodontic appliance is generally used herein to refer to a device, either fixed to the teeth or removable, that applies force to the teeth and their supporting structures to produce changes in their relationship to each other and to control their growth and development.³

Thus, at least paragraph [0063] of Applicant’s disclosure indicates that the content of the amendment to the specification was described in the application as originally filed.

For at least these reasons, Applicant respectfully submits that the amendments to the specification presented in the Amendment filed on December 17, 2008 do not introduce new matter into the disclosure. Reconsideration and withdrawal of the objection to the specification are respectfully requested.

Claim Rejection Under 35 U.S.C. § 112, First Paragraph

In the final Office Action, claims 38 and 74 were rejected under 35 U.S.C. § 112, first paragraph. The Office Action asserted that claims 38 and 74 contain subject matter that was not

² *Id.* at p. 3, item 5.

³ Emphasis added.

described in Applicant's specification in such a way as to enable one having ordinary skill in the art to make and/or use the invention.⁴ According to the Office Action, "[t]he specification does not reasonably provide enablement for a sheath, a button, or an archwire. The sheath and button are not enabled because there is no physical description or illustration of precisely what applicant is considering a sheath or a button. Additionally, such terms are not well defined in the art and have no special technical mean [sic]."⁵ With respect to the archwire, the Office Action stated that "given the physical/geometric differences between the arch wire as claimed and bracket as describe [sic] the specification is not enabling as to how the planar guides aid the practitioner in placement of arch wires." Applicant respectfully disagrees with the Office Action and submits that claims 38 and 74 meet the limitations of 35 U.S.C. § 112, first paragraph.

First, as an initial matter, Applicant notes that the Office Action has failed to meet the burden of establishing a reasonable basis for questioning the enablement of the invention of claims 38 and 74. As provided in MPEP §§ 2161.01 and 2164.04, the Examiner must establish a reasonable basis for questioning the adequacy of the disclosure to enable a person of ordinary skill in the art to make and use the claimed invention without resorting to undue experiments. The MPEP provides that the burden can be met by providing specific findings and evidence that led the Examiner to conclude that the specification fails to teach how to make and use the claimed invention without undue experimentation. The Office Action, however, lacks any assertion that Applicant's specification fails to teach how to make and use the claimed invention without undue experimentation, much less any specific findings or evidence to support such an assertion, as required. If the rejection under 35 U.S.C. § 112, first paragraph is maintained, Applicant respectfully requests clarification of the grounds of the rejection.

Second, contrary to the assertions in the Office Action, a planar guide that is a visual aid to a practitioner in a placement of a sheath or button relative to a tooth of a dental arch within a three-dimensional (3D) environment is enabled by the present application. The Examiner based the rejection on a premise that a sheath and a button are not well known orthodontic appliances. However, contrary to the Office Action's assertions, the terms "sheath" and "button" are well defined in the art and have a known technical meaning. The structures of these terms are well known and capable of being determined without undue experimentation. As discussed above,

⁴ Office Action dated May 18, 2009, p. 4, item 8.

⁵ *Id.* at p. 4, item 8.

Applicant has submitted a Declaration Under 37 C.F.R. § 1.132 that provides substantial evidence establishes that a button and a sheath are well known types of orthodontic appliances, including a photocopy of an orthodontic dictionary that recites well-established definitions for these types of appliances.

Given the notoriety of sheaths and buttons in the art, Applicant's disclosure enables claims 38 and 74 even if Applicant's disclosure does not provide a detailed physical description or illustration of precisely a conventional sheath or a button. The present application does not redefine these terms in any way. One having ordinary skill in the art would understand what the claimed sheath and button refer to and the physical descriptions thereof. Therefore, there is no reasonable basis for asserting that a person of ordinary skill in the art would have to resort to undue experimentation to make and use the inventions of Applicant's claims 38 and 74.

In addition, there is no reasonable basis for asserting that a person of ordinary skill in the art would have to resort to undue experimentation to make and use the method and system of claims 38 and 74, respectively, which each require a planar guide that is a visual aid to a practitioner in a placement of an archwire relative to a tooth of a dental arch within a 3D environment is enabled. Even if an archwire and bracket are physically and/or geometrically different, as asserted by the Office Action, the Office Action failed to establish that undue experimentation would be required in order to make and use the inventions of claims 38 and 74. Applicant's claimed method and system recited in claims 38 and 74 provide advantages with respect to placing orthodontic appliances on model of patient teeth regardless of the particular type of appliance. The particular type of appliance has no impact on the ability of one of ordinary skill in the art to make and use the claimed method and system and the planar guides recited therein. Applicant's disclosure provides sufficient details with which person of ordinary skill in the art would be able to make and use the claimed invention without resorting to undue experimentation.

As noted in the Amendment filed on December 17, 2008, Applicant's specification describes how the planar guides are rendered for a sheath, a button, and an archwire. While the specification primarily refers to a bracket, the specification also makes clear that the techniques described therein may be applied to positioning and orienting other types of orthodontic appliances.⁶ Applicant need not separately illustrate rendering of each different type of

⁶ Applicant's originally-filed disclosure at paragraph [0063].

orthodontic appliance to comply with the enablement requirement of 35 U.S.C. § 112, first paragraph.⁷

The details provided in Applicant's disclosure regarding use of planar guides to assist in the positioning of brackets may be applied by one skilled in the art to generate planar guides that assist a practitioner in positioning orthodontic appliances other than brackets without undue experimentation. For example, Applicant's disclosure describes a mesial planar guide that may be rendered parallel to and equidistant from a midsagittal plane of a bracket being placed. A sheath, button, and archwire may have a midsagittal plane, which is a well-known term that refers to a plane that divides an object into right and left halves.⁸ Thus, one skilled in the art would recognize that the mesial planar guide may be rendered parallel to the midsagittal plane of the respective orthodontic appliance. As another example, Applicant's disclosure describes a distal planar guide that penetrates a distal edge of a digital representation of a tooth.⁹ Thus, regardless of the type of orthodontic appliance, one skilled in the art would recognize that a planar guide that penetrates a distal edge of a tooth may also be rendered to aid in the placement of the orthodontic appliance relative to a digital representation of the tooth.

The Office Action also questioned how the planar guides aid the practitioner in placement of a sheath, button, and archwire. However, the disclosure related to brackets in Applicant's disclosure indicates how planar guides may aid the practitioner in placement of a sheath, button, and archwire. Planar guides associated with a bracket may assist a practitioner in achieving proper appliance placement of a bracket according to anatomical features of the teeth.¹⁰ Just as midlateral, midfrontal, and midsagittal planar guides associated with a bracket may be useful in dissecting the tooth and visualizing cross-sections of the tooth,¹¹ midlateral, midfrontal, and midsagittal planar guides associated with a sheath, a button or an archwire may be useful in dissecting the tooth and visualizing cross-sections of the tooth in a similar manner. For example, in some embodiments, the planar guides may allow a practitioner to precisely position and orient a bracket on a tooth by effectively framing a tooth. In particular, the planar guides may help position the bracket or any other appliance relative to a perceived midsagittal

⁷ MPEP § 2164.02.

⁸ See, e.g., http://www.biology-online.org/dictionary/Midsagittal_plane and http://en.wikipedia.org/wiki/Sagittal_plane.

⁹ Applicant's originally-filed disclosure, paragraph [0057].

¹⁰ *Id.* at paragraph [0034].

¹¹ *Id.* at paragraph [0033].

plane of a tooth or an occlusal plane of a dental arch.¹² One having ordinary in the art would recognize that the anatomical features of a tooth may also be important to identify for placing a sheath, a button or an archwire relative to a dental arch. There is no evidence of record to suggest that the different structural features of these conventional orthodontic appliances would prohibit one of ordinary skill in the art from making and using Applicant's claimed invention.

As described in Applicant's disclosure, a planar guide generally visually aids a practitioner in the placement of an orthodontic appliance within a 3D environment by helping the practitioner visually determine the distance between the planar guide and other objects within the 3D environment, such as a surface of a tooth. Regardless of the type of orthodontic appliance, an indication of the relative positioning between a planar guide and an object within a 3D environment may be beneficial. No undue experimentation is necessary to determine how a planar guide may provide a visual aid to a practitioner in the placement of sheath, button or archwire within a 3D environment.

Based on Applicant's disclosure, one having ordinary in the art would be able to practice a method that includes displaying a planar guide within a 3D environment as a visual aid to a practitioner in the placement of a sheath, button, and archwire relative to a digital representation of a dental arch without undue experimentation. Similarly, one skilled in the art would be able to make and use modeling software that includes a user interface that displays a planar guide within a 3D environment as a visual aid to a practitioner in the placement of a sheath, button, and archwire relative to the dental arch without undue experimentation.

For at least these reasons, Applicant's specification enables claims 38 and 74. Reconsideration and withdrawal of the rejection are respectfully requested.

Claim Rejection Under 35 U.S.C. § 112, second paragraph

In the Office Action, claims 5–11, 28, 30, 44–50, 64, 66, and 78 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. The Office Action asserted that it is unclear “what a midsagittal plane, midlateral plane, midfrontal plane, and an occlusal-gingival axis of the *orthodontic appliance* are.”¹³ Specifically, the Office Action

¹² *Id.* at paragraph [0032].

¹³ Office Action dated May 18, 2009, p. 5, item 10 (emphasis in original).

questioned whether “a midsagittal plane of an orthodontic appliance as claim [sic] is always parallel to the mesial-distal planes of the dental arch or is the midsagittal plane of the orthodontic appliance dependent on the local orientation of the appliance?” Applicant thanks the Examiner for clarifying the rejection of the claims under 35 U.S.C. § 112, second paragraph, and submits that claims 5–11, 28, 30, 44–50, 64, 66, and 78 are definite and answer the question posed by the Office Action. That is, as described in further detail below, the claims clearly indicate that the “midsagittal plane, midlateral plane, midfrontal plane, and an occlusal-gingival axis” are dependent on the orientation of the orthodontic appliance because they are respective planes or an axis of the orthodontic appliance.

Definiteness of a claim must be analyzed, not in a vacuum, but in light of the content of, among other things, Applicant’s disclosure as well as the claim interpretation that would be given by one having ordinary skill in the art at the time the invention as made.¹⁴ Applicant’s claims 5–11, 28, 30, 44–50, 64, 66, and 78 apprise one having ordinary skill in the art of their respective scopes, and, therefore serves the notice function required by 35 U.S.C. § 112, second paragraph.

For example, claims 5, 10, 30, 44, 49, 66, and 78 each explicitly state that the midsagittal plane “is a plane of the orthodontic appliance.” Contrary to the Office Action’s assertions, claims 5, 10, 30, 44, 49, 66, and 78 do not even suggest that the midsagittal plane is a plane of a dental arch or raise a clarity issue. The language of claims 5, 10, 30, 44, 49, 66, and 78 specify with a reasonable degree of particularity that the midsagittal plane is a plane of the orthodontic appliance, and, therefore, the orientation of the plane depends on the orientation of the orthodontic appliance. Thus, the plain language of the claims answers the Examiner’s question that the recited planes of the orthodontic appliance and, therefore, dependent on the orientation of the appliance.

The content of Applicant’s disclosure is consistent with this language of claims 5, 10, 30, 44, 49, 66, and 78 (as well as the other claims). Applicant’s disclosure describes a midsagittal plane that has an orientation that depends on the orientation of the appliance, rather than a midsagittal plane that is rendered parallel to the mesial-distal planes of a dental arch. For example, Applicant’s disclosure states that planar guides can be parallel to certain planes inherent to an orthodontic appliance.¹⁵ Applicant’s disclosure further states that a midsagittal

¹⁴ See MPEP 2173.02.

¹⁵ Applicant’s disclosure, paragraph [0034].

plane of a bracket is parallel to the longitudinal axis of the bracket.¹⁶ In addition, Applicant's disclosure states that the planar guides are located in a coordinate system associated with a bracket.¹⁷ Therefore, as a bracket changes orientation, its coordinate system, and respective planar guides change orientation.

Claims 7, 8, 11, 46, 47, 50, and 78 are each definite for similar reasons discussed with respect to claim 5. Claims 7, 8, 11, 46, 47, 50, and 78 each recite a midlateral plane of the orthodontic appliance. Therefore, claims 7, 8, 11, 46, 47, 50, and 78 each require the midlateral plane to be a plane of the orthodontic appliance, rather than a plane of a dental arch, such that as the orthodontic appliance changes orientation, the midlateral plane also changes orientation.

Claims 9, 48, and 78 each refer to a midfrontal plane of the orthodontic appliance. Because claims 9, 48, and 78 are explicit as to whether the plane is a plane of the orthodontic appliance or of a dental arch, claims 9, 48, and 78 each particularly point out and distinctly claim the subject matter that Applicant regards as the invention.

Claims 28 and 64 each refer to an occlusal-gingival axis of the orthodontic appliance. Thus, claims 28 and 64 clearly state that the occlusal-gingival axis is an axis of the orthodontic appliance. One having ordinary skill in the art at the time Applicant's disclosure was filed would have understood that because the occlusal-gingival axis is an axis of the orthodontic appliance, the axis changes orientation as the orthodontic appliance changes orientation. The definiteness of claims 28 and 64 is further demonstrated by Applicant's disclosure, which states that mesial and distal planar guides visibly align with the mesial and distal edges of the bracket, respectively, if the bracket was designed to exhibit edges that are parallel to one another and to the occlusal-gingival axis of the bracket.¹⁸

Even if terms such as "midsagittal" are ordinarily used to describe an anatomic portion or plane, as asserted by the Office Action, the terms by Applicant to describe planes or axes of an orthodontic appliance do not render Applicant's claims 5-11, 28, 30, 44-50, 64, 66, and 78 indefinite. Rather, Applicant's claims still recite the claimed inventions with a reasonable degree of particularity for at least the reasons discussed in the Amendment filed on April 10, 2008, and, therefore, meet the limitations of 35 U.S.C. 112, second paragraph.¹⁹

¹⁶ *Id.* at paragraph [0045].

¹⁷ *Id.* at paragraph [0008].

¹⁸ *Id.* at paragraph [0041].

¹⁹ *See* MPEP 2173.02.

For at least these reasons, claims 5–11, 28, 30, 44–50, 64, 66, and 78 particularly point out and distinctly claim the subject matter, as required by 35 U.S.C. 112, second paragraph. Only after a claim remains “insolubly ambiguous without a discernable meaning after all reasonable attempts at construction” must a claim be declared indefinite.²⁰ The Office Action failed to establish that Applicant’s claims 5–11, 28, 30, 44–50, 64, 66, and 78 are “insolubly ambiguous.”

For at least this reason and the reasons discussed above, Applicant respectfully requests reconsideration and withdrawal of the rejection of the claims under 35 U.S.C. § 112, second paragraph.

Claim Rejection Under 35 U.S.C. §§ 102(b) and 103(a)

In the final Office Action, claims 1–4, 10, 12, 13, 18, 19, 31–35, 37, 38, 39–43, 49, 51–55, 73–78, and 80–82 were rejected under 35 U.S.C. § 102(b) as being anticipated by Chapoulaud. In addition, claims 5–9, 11, 14–17, 20–28, 36, 44–48, 50, 56–64, 67–72, and 83–86 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Chapoulaud, and claims 29, 30, 65, 66, and 79 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Chapoulaud in view of Kopelman et al. (U.S. Patent Application Publication No. 2003/014509, hereinafter “Kopelman”).

Applicant respectfully traverses the rejection of the claims. Chapoulaud, alone or in combination with Kopelman, fails to disclose or suggest each and every feature of the claimed invention, as required by 35 U.S.C. §§ 102(b) and 103(a), and provides no teaching that would have suggested the desirability of modification to include such features.

Independent Claims 1, 4, 39, and 75

For example, Chapoulaud fails to disclose or suggest a method comprising displaying a digital representation of a tooth of a dental arch within a 3D environment, and, while displaying the digital representation of the tooth of the dental arch, displaying a two-dimensional planar guide within the 3D environment as a visual aid to a practitioner in the placement of an orthodontic appliance relative to the tooth of the dental arch, where the two-dimensional planar

²⁰ MPEP 2173.02, citing *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1366 (Fed. Cir. 2004).

guide is displayed separately from the digital representation of the tooth, as recited by Applicant's independent claims 1 and 4. As another example, Chapoulaud fails to disclose or suggest a method in which displaying a two-dimensional planar guide comprises, as the practitioner moves the orthodontic appliance relative to the tooth within the 3D environment, rendering the planar guide at a location that is based on a position of the orthodontic appliance within the 3D environment, as recited by claim 1, or a method in which displaying a planar guide comprises automatically moving the planar guide within the 3D environment as the practitioner moves the orthodontic appliance with respect to the tooth within the 3D environment, as recited by claim 4

In support of the rejection of the claims, the Office Action appeared to characterize both a positioning grid G that intersects the boundaries of a mandibular trough, shown in FIG. 5D of Chapoulaud, and vector images of teeth shown in FIG. 5G of Chapoulaud, as the planar guide of Applicant's claims. Applicant respectfully disagrees that either the positioning grid or the vector images of teeth disclosed by Chapoulaud can reasonably be characterized as a planar guide in accordance with Applicant's independent claims. Moreover, Applicant respectfully submits that the Office Action cannot combine unrelated elements of Chapoulaud (i.e., the positioning grid and the vector images of teeth) and characterize the combined features of the unrelated elements as a single planar guide recited by Applicant's claims. Moreover, the positioning grid G and the vector images of teeth each fail to meet the requirements of the planar guides of Applicant's independent claims.

The methods of Applicant's independent claims 1 and 4 require displaying a digital representation of a tooth within a 3D environment and, while displaying the digital representation of the tooth, displaying a two-dimensional planar guide within the same 3D environment. Thus, the digital representation of the tooth and the planar guide recited in claims 1 and 4 are different objects that are displayed within a 3D environment at the same time. As discussed in further detail in the Amendment filed on April 10, 2008, the vector tooth images disclosed by Chapoulaud literally represent the individual teeth of the patient and cannot reasonably be characterized as planar guides as recited in claims 1 and 4. For example, claims 1 and 4 specify that the respective methods include displaying both a digital representation of a tooth of a dental arch and a planar guide within the same 3D environment. Neither FIG. 5G of Chapoulaud, nor any other figures of Chapoulaud, illustrates a digital representation of a tooth, a

two-dimensional planar guide, and an orthodontic appliance, as required by Applicant's claims 1 and 4.

In contrast to the vector images of the teeth disclosed by Chapoulaud, the inventions recited in independent claims 1 and 4 aid a practitioner in the placement of an orthodontic object relative to a tooth of a dental arch within a 3D environment by displaying both the tooth and the planar guide. Because the location of the planar guide changes as the practitioner moves an orthodontic appliance relative to the tooth, the planar guide helps provide a good visual indication of the position of the orthodontic appliance relative to another displayed object, i.e., the tooth.²¹ Chapoulaud, however, fails to disclose displaying a separate tooth and a planar guide and also fails to teach or suggest rendering the planar guide at a location that is based on a position of the orthodontic appliance within the 3D environment as the practitioner moves the orthodontic appliance relative to the tooth within the 3D environment, as recited by Applicant's claim 1 or automatically moving the planar guide within the 3D environment as the practitioner moves the orthodontic appliance with respect to the tooth within the 3D environment, as recited by claim 4.

Even if the vector images of teeth disclosed by Chapoulaud are planar guides, an assertion with which Applicant disagrees, Chapoulaud fails to disclose or suggest that a practitioner can move an orthodontic appliance relative to a tooth that is displayed separately from the planar guide, or that the vector image of the tooth is rendered at a location that is based on a position of the orthodontic appliance within the 3D environment as the practitioner moves the appliance. Claim 1 requires, as the practitioner moves the orthodontic appliance within the 3D environment, rendering the planar guide at a location that is based on a location of the orthodontic appliance. Thus, according to claim 1, the planar guide moves within the 3D environment as the practitioner moves the orthodontic appliance. Similarly, independent claim 4 requires automatically moving the planar guide within the 3D environment as the practitioner moves the orthodontic appliance with respect to the tooth within the 3D environment. While Chapoulaud discloses that a user can move an orthodontic appliance,²² Chapoulaud fails to disclose any feature that moves as a practitioner moves the orthodontic appliance within a 3D environment. Neither the positioning grid nor the vector images of teeth move as a practitioner

²¹ See, e.g., Applicant's disclosure, paragraph [0008].

²² Chapoulaud, paragraph [0091].

moves an orthodontic appliance. Accordingly, Chapoulaud does not disclose the invention of Applicant's independent claims 1 and 4. Additional arguments directed to this point may be found in Applicant's Amendment filed on April 10, 2008, which Applicant incorporates herein in its entirety.

Chapoulaud also fails to disclose or suggest that the positioning grid G is a planar guide that is rendered at a location that is based on a position of the orthodontic appliance within the 3D environment, as required by Applicant's claims 1 and 4. Therefore, the positioning grid G disclosed by Chapoulaud also fails to meet the requirements of a planar guide of Applicant's claims 1 and 4. According to Chapoulaud, the positioning grid intersects the boundaries of the mandibular trough.²³ Therefore, the positioning grid disclosed by Chapoulaud is used to identify a very specific location of the dental arch and does not move within a 3D environment based on a position of the orthodontic appliance within the 3D environment. Indeed, it would undermine the fundamental principle of operation of the Chapoulaud positioning grid if the location of the positioning grid was dependent upon the position of an orthodontic appliance within a 3D environment. The positioning grid is intended to be a stationary grid, unless specifically moved by an operator, to indicate the boundaries of a mandibular trough.²⁴ There is no rational reason that the boundaries of the mandibular trough would change based upon a position of an orthodontic appliance.

Chapoulaud completely lacks any disclosure that states that the location of its positioning grid is based on a placement of an orthodontic appliance with the 3D environment relative to a dental arch. Quite the contrary, Chapoulaud discloses that the grid is initially placed relative to the digital bitmap of a dental arch itself.²⁵ The location of the grid can then be adjusted by an operator, such as by clicking on the grid and manually moving points of the grid.²⁶ Chapoulaud does not, however, disclose any relationship between the location of the planar guide within the 3D environment and a position of the orthodontic appliance. In contrast, claims 1 and 4 each positively require a planar guide to be rendered or moved based on a position of the orthodontic appliance within the 3D environment. Indeed, the Chapoulaud grid appears to be independently movable without any regard to the placement of an orthodontic appliance, or even the placement

²³ *Id.* at [0076].

²⁴ *Id.*

²⁵ *Id.*

²⁶ *Id.*

of the dental arch. Consequently, Chapoulaud does not teach displaying the planar guide as a visual aid to a practitioner in adjusting the placement of the orthodontic appliance relative to the dental arch, as required by claim 1 as amended.

While Chapoulaud discusses adjusting the torque, tip and rotation of brackets²⁷, this has no affect on the position or orientation of the grid. Chapoulaud does not teach or even suggest using the positioning grid as a visual aid to the practitioner in adjusting the placement of the bracket. Chapoulaud only discloses using the positioning grid to define the boundaries of each tooth image relative to other teeth so that individual tooth images can be manipulated. Furthermore, Chapoulaud only discloses use of the positioning grid during the phase in which the boundaries of each tooth image are determined, and the positioning grid is not even displayed when an orthodontic appliance is displayed.²⁸

For at least the reasons discussed above with respect to independent claims 1 and 4, the cited references fail to disclose or suggest a system comprising a computing device, and modeling software executing on the computing device, where the modeling software comprises a rendering engine that renders a digital representation of a tooth of a dental arch within a 3D environment, and a user interface that displays the digital representation of the tooth of the dental arch while displaying a two-dimensional planar guide within the 3D environment as a visual aid to a practitioner in a placement of an orthodontic appliance relative to the dental arch within the 3D environment, where the rendering engine displays the planar guide separately from the digital representation of the tooth, and wherein, as the practitioner moves the orthodontic appliance relative to the tooth within the 3D environment, the rendering engine renders the planar guide at a location based on a position of the orthodontic appliance within the 3D environment, as required by Applicant's independent claim 39.

In addition, for at least the reasons discussed above with respect to independent claim 1, Chapoulaud also fails to disclose or suggest each and every limitation of independent claim 75. Claim 75 recites a computer-readable medium comprising instructions for causing a programmable processor to render a digital representation of a tooth within a 3D environment, and, while displaying the digital representation of the tooth, display a two-dimensional planar guide within the 3D environment as a visual aid to a practitioner in the placement of an

²⁷ *Id.* at paragraph [0091].

²⁸ *See id.* at FIG. 5E.

orthodontic appliance relative to the tooth within the 3D environment, where the planar guide is displayed separately from the digital representation of the tooth, and where the instructions cause the programmable processor to display the planar guide by, as the practitioner moves the orthodontic appliance relative to the tooth within the 3D environment, rendering the planar guide at a location based on a position of the orthodontic appliance within the 3D environment.

Dependent Claims 2, 3, 5-38, 40-74, and 76-82

Claims 2, 3, 5-38, 40-74, and 76-82 depend from one of independent claims 1, 4, 39, and 75, and are patentable over the cited references for at least the reasons given above with respect to the independent claims. Claims 2, 3, 5-38, 40-74, and 76-82 recite additional limitations that are neither disclosed nor suggested by Chapoulaud or the other cited art (e.g., Kopelman). In the Amendment filed on April 10, 2008, Applicant addressed some of the dependent claims for purposes of illustration. Applicant maintains the arguments presented in the Amendment filed on April 10, 2008 with respect to the rejection of the dependent claims, as well as the independent claims.

For at least the reasons discussed above and in the Amendment filed on April 10, 2008, the Examiner has failed to establish a *prima facie* case for non-patentability of Applicant's claims 1-86 under 35 U.S.C. §§ 102(b) and 103(a). Reconsideration and withdrawal of the rejection of the claims are respectfully requested.


CONCLUSION

All claims in this application are in condition for allowance. Applicant respectfully requests reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 50-1778. The Examiner is invited to telephone the below-signed attorney to discuss this application.

Date: October 19, 2009

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By:


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